MATERIAL DATA SHEET

AA5383 Mg4.5 wt.% Mg hot plane-strain compression matrix (CC BY experimental)

Measured composition, 200-500 degC peak-flow-stress matrix and Arrhenius activation energy for the Mg4.5-5383 experimental variant.

Field	Value
Material ID	mdpi-aa5383-mg4p5-hot-plane-strain-compression
Category	Metal
Condition	experimental Mg4.5-5383 composition after the article's Gleeble thermal cycle and during plane-strain compression | supplier 5383 alloy compressed in a Gleeble simulator; initial product form and specimen dimensions not stated in the article text
Unit system	Common SI
Unit contract	Material properties stored in SI engineering units.
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Source and Validity

Field	Value
Quality	Experimental screening
Design release allowed	No
Source family	Experimental screening dataset
Confidence	Reference-grade
License	Open
Source note	Condition-specific base-material values from a CC BY 4.0 peer-reviewed article.
Citation	Zili Ye, Zixiao Zhou, Zhaolin Ye, Zhi Wang, Qizhong Zhao, and Konda Gokuldoss Prashanth, An Investigation into the Thermomechanical Processing and Dynamic Recrystallization Mechanisms of High-Magnesium Aluminum Alloys, Materials 2025, 18, 2734, https://doi.org/10.3390/ma18122734.
Valid temperature	200 ... 500 degC (Peak flow stress is tabulated only at 200, 260, 320, 380, 440 and 500 degC and at three stated strain rates.)
Valid pressure	Pressure dependence is not represented.
Valid phase / condition	experimental Mg4.5-5383 composition after the article's Gleeble thermal cycle and during plane-strain compression
Uncertainty	Exact article-designated Mg4.5-5383 chemistry and the full tabulated hot-compression matrix are retained. The article's reported full-strain safe region is 420-500 degC at 0.05-0.4 1/s over the article's full strain range. Initial temper, product form, specimen dimensions and replicate scatter are not stated. These peak flow stresses are not room-temperature tensile/yield values, standard minima or design allowables.
Last reviewed	2026-08-03

Field	Value
Reviewer	scripts/import_mdpi_open_aluminum_public.py
Review status	Checked
Review scope	Checked article CC BY notice, DOI and PDF hash, exact alloy/temper, source geometry, table values, and reported or measured rather than specified-minimum semantics.
Notes	Exact article-designated Mg4.5-5383 chemistry and the full tabulated hot-compression matrix are retained. The article's reported full-strain safe region is 420-500 degC at 0.05-0.4 1/s over the article's full strain range. Initial temper, product form, specimen dimensions and replicate scatter are not stated. These peak flow stresses are not room-temperature tensile/yield values, standard minima or design allowables.
License ID	CC-BY-4.0
License URL	https://creativecommons.org/licenses/by/4.0/
Attribution	Zili Ye

Material Condition

Field	Value
Condition	experimental Mg4.5-5383 composition after the article's Gleeble thermal cycle and during plane-strain compression
Temper	initial temper not stated; do not infer H116
Heat treatment	500 degC at 5 degC/s, 3 min hold, controlled cooling to test temperature, 2 min stabilisation; liquid-nitrogen quench after deformation
Product form	supplier 5383 alloy compressed in a Gleeble simulator; initial product form and specimen dimensions not stated in the article text
Thickness / diameter range	not reported
Test direction	plane-strain compression direction not stated
Processing route	hot plane-strain compression to 60 percent deformation; 1 degC/s cooling above 400 degC and 5 degC/s below 400 degC
Temperature range	200 ... 500 degC
Notes	Exact article-designated Mg4.5-5383 chemistry and the full tabulated hot-compression matrix are retained. The article's reported full-strain safe region is 420-500 degC at 0.05-0.4 1/s over the article's full strain range. Initial temper, product form, specimen dimensions and replicate scatter are not stated. These peak flow stresses are not room-temperature tensile/yield values, standard minima or design allowables.

Properties

Mechanical

Property	Value	Unit	Type	Applies to
Peak flow stress at 200 degC and 0.05 1/s	318.39	MPa	Experimental Measured Hot Deformation Screening	experimental Mg4.5-5383 alloy supplied by ALG Aluminium; heated to 500 degC at 5 degC/s, held 3 min, cooled to target temperature, stabilised 2 min, plane-strain compressed to 60 percent at 0.05, 0.5 or 5 1/s, then liquid-nitrogen quenched
Peak flow stress at 260 degC and 0.05 1/s	241.81	MPa	Experimental Measured Hot Deformation Screening	experimental Mg4.5-5383 alloy supplied by ALG Aluminium; heated to 500 degC at 5 degC/s, held 3 min, cooled to target temperature, stabilised 2 min, plane-strain compressed to 60 percent at 0.05, 0.5 or 5 1/s, then liquid-nitrogen quenched
Peak flow stress at 320 degC and 0.05 1/s	175.11	MPa	Experimental Measured Hot Deformation Screening	experimental Mg4.5-5383 alloy supplied by ALG Aluminium; heated to 500 degC at 5 degC/s, held 3 min, cooled to target temperature, stabilised 2 min, plane-strain compressed to 60 percent at 0.05, 0.5 or 5 1/s, then liquid-nitrogen quenched
Peak flow stress at 380 degC and 0.05 1/s	120.98	MPa	Experimental Measured Hot Deformation Screening	experimental Mg4.5-5383 alloy supplied by ALG Aluminium; heated to 500 degC at 5 degC/s, held 3 min, cooled to target temperature, stabilised 2 min, plane-strain compressed to 60 percent at 0.05, 0.5 or 5 1/s, then liquid-nitrogen quenched
Peak flow stress at 440 degC and 0.05 1/s	74.66	MPa	Experimental Measured Hot Deformation Screening	experimental Mg4.5-5383 alloy supplied by ALG Aluminium; heated to 500 degC at 5 degC/s, held 3 min, cooled to target temperature, stabilised 2 min, plane-strain compressed to 60 percent at 0.05, 0.5 or 5 1/s, then liquid-nitrogen quenched

Property	Value	Unit	Type	Applies to
Peak flow stress at 500 degC and 0.05 1/s	52.52	MPa	Experimental Measured Hot Deformation Screening	experimental Mg4.5-5383 alloy supplied by ALG Aluminium; heated to 500 degC at 5 degC/s, held 3 min, cooled to target temperature, stabilised 2 min, plane-strain compressed to 60 percent at 0.05, 0.5 or 5 1/s, then liquid-nitrogen quenched
Peak flow stress at 200 degC and 0.5 1/s	341.97	MPa	Experimental Measured Hot Deformation Screening	experimental Mg4.5-5383 alloy supplied by ALG Aluminium; heated to 500 degC at 5 degC/s, held 3 min, cooled to target temperature, stabilised 2 min, plane-strain compressed to 60 percent at 0.05, 0.5 or 5 1/s, then liquid-nitrogen quenched
Peak flow stress at 260 degC and 0.5 1/s	272.27	MPa	Experimental Measured Hot Deformation Screening	experimental Mg4.5-5383 alloy supplied by ALG Aluminium; heated to 500 degC at 5 degC/s, held 3 min, cooled to target temperature, stabilised 2 min, plane-strain compressed to 60 percent at 0.05, 0.5 or 5 1/s, then liquid-nitrogen quenched
Peak flow stress at 320 degC and 0.5 1/s	216.59	MPa	Experimental Measured Hot Deformation Screening	experimental Mg4.5-5383 alloy supplied by ALG Aluminium; heated to 500 degC at 5 degC/s, held 3 min, cooled to target temperature, stabilised 2 min, plane-strain compressed to 60 percent at 0.05, 0.5 or 5 1/s, then liquid-nitrogen quenched
Peak flow stress at 380 degC and 0.5 1/s	162.21	MPa	Experimental Measured Hot Deformation Screening	experimental Mg4.5-5383 alloy supplied by ALG Aluminium; heated to 500 degC at 5 degC/s, held 3 min, cooled to target temperature, stabilised 2 min, plane-strain compressed to 60 percent at 0.05, 0.5 or 5 1/s, then liquid-nitrogen quenched

Property	Value	Unit	Type	Applies to
Peak flow stress at 440 degC and 0.5 1/s	115.48	MPa	Experimental Measured Hot Deformation Screening	experimental Mg4.5-5383 alloy supplied by ALG Aluminium; heated to 500 degC at 5 degC/s, held 3 min, cooled to target temperature, stabilised 2 min, plane-strain compressed to 60 percent at 0.05, 0.5 or 5 1/s, then liquid-nitrogen quenched
Peak flow stress at 500 degC and 0.5 1/s	81.634	MPa	Experimental Measured Hot Deformation Screening	experimental Mg4.5-5383 alloy supplied by ALG Aluminium; heated to 500 degC at 5 degC/s, held 3 min, cooled to target temperature, stabilised 2 min, plane-strain compressed to 60 percent at 0.05, 0.5 or 5 1/s, then liquid-nitrogen quenched
Peak flow stress at 200 degC and 5 1/s	340.57	MPa	Experimental Measured Hot Deformation Screening	experimental Mg4.5-5383 alloy supplied by ALG Aluminium; heated to 500 degC at 5 degC/s, held 3 min, cooled to target temperature, stabilised 2 min, plane-strain compressed to 60 percent at 0.05, 0.5 or 5 1/s, then liquid-nitrogen quenched
Peak flow stress at 260 degC and 5 1/s	283.41	MPa	Experimental Measured Hot Deformation Screening	experimental Mg4.5-5383 alloy supplied by ALG Aluminium; heated to 500 degC at 5 degC/s, held 3 min, cooled to target temperature, stabilised 2 min, plane-strain compressed to 60 percent at 0.05, 0.5 or 5 1/s, then liquid-nitrogen quenched
Peak flow stress at 320 degC and 5 1/s	243.34	MPa	Experimental Measured Hot Deformation Screening	experimental Mg4.5-5383 alloy supplied by ALG Aluminium; heated to 500 degC at 5 degC/s, held 3 min, cooled to target temperature, stabilised 2 min, plane-strain compressed to 60 percent at 0.05, 0.5 or 5 1/s, then liquid-nitrogen quenched

Property	Value	Unit	Type	Applies to
Peak flow stress at 380 degC and 5 1/s	187.14	MPa	Experimental Measured Hot Deformation Screening	experimental Mg4.5-5383 alloy supplied by ALG Aluminium; heated to 500 degC at 5 degC/s, held 3 min, cooled to target temperature, stabilised 2 min, plane-strain compressed to 60 percent at 0.05, 0.5 or 5 1/s, then liquid-nitrogen quenched
Peak flow stress at 440 degC and 5 1/s	146.84	MPa	Experimental Measured Hot Deformation Screening	experimental Mg4.5-5383 alloy supplied by ALG Aluminium; heated to 500 degC at 5 degC/s, held 3 min, cooled to target temperature, stabilised 2 min, plane-strain compressed to 60 percent at 0.05, 0.5 or 5 1/s, then liquid-nitrogen quenched
Peak flow stress at 500 degC and 5 1/s	113.94	MPa	Experimental Measured Hot Deformation Screening	experimental Mg4.5-5383 alloy supplied by ALG Aluminium; heated to 500 degC at 5 degC/s, held 3 min, cooled to target temperature, stabilised 2 min, plane-strain compressed to 60 percent at 0.05, 0.5 or 5 1/s, then liquid-nitrogen quenched
Hot-deformation activation energy	185.2841	kJ/mol	Experimental Fitted Constitutive Parameter Screening	experimental Mg4.5-5383 alloy supplied by ALG Aluminium; heated to 500 degC at 5 degC/s, held 3 min, cooled to target temperature, stabilised 2 min, plane-strain compressed to 60 percent at 0.05, 0.5 or 5 1/s, then liquid-nitrogen quenched

Composition

Property	Value	Unit	Type	Applies to
Magnesium mass fraction	4.49	wt.%	Experimental Measured Composition Reference	experimental Mg4.5-5383 alloy supplied by ALG Aluminium; heated to 500 degC at 5 degC/s, held 3 min, cooled to target temperature, stabilised 2 min, plane-strain compressed to 60 percent at 0.05, 0.5 or 5 1/s, then liquid-nitrogen quenched
Manganese mass fraction	0.68	wt.%	Experimental Measured Composition Reference	experimental Mg4.5-5383 alloy supplied by ALG Aluminium; heated to 500 degC at 5 degC/s, held 3 min, cooled to target temperature, stabilised 2 min, plane-strain compressed to 60 percent at 0.05, 0.5 or 5 1/s, then liquid-nitrogen quenched
Silicon mass fraction	0.07	wt.%	Experimental Measured Composition Reference	experimental Mg4.5-5383 alloy supplied by ALG Aluminium; heated to 500 degC at 5 degC/s, held 3 min, cooled to target temperature, stabilised 2 min, plane-strain compressed to 60 percent at 0.05, 0.5 or 5 1/s, then liquid-nitrogen quenched
Chromium mass fraction	0.08	wt.%	Experimental Measured Composition Reference	experimental Mg4.5-5383 alloy supplied by ALG Aluminium; heated to 500 degC at 5 degC/s, held 3 min, cooled to target temperature, stabilised 2 min, plane-strain compressed to 60 percent at 0.05, 0.5 or 5 1/s, then liquid-nitrogen quenched
Iron mass fraction	0.16	wt.%	Experimental Measured Composition Reference	experimental Mg4.5-5383 alloy supplied by ALG Aluminium; heated to 500 degC at 5 degC/s, held 3 min, cooled to target temperature, stabilised 2 min, plane-strain compressed to 60 percent at 0.05, 0.5 or 5 1/s, then liquid-nitrogen quenched

Processing

Property	Value	Unit	Type	Applies to
Peak power dissipation efficiency	39.0	%	Experimental Processing Map Parameter Screening	experimental Mg4.5-5383 alloy supplied by ALG Aluminium; heated to 500 degC at 5 degC/s, held 3 min, cooled to target temperature, stabilised 2 min, plane-strain compressed to 60 percent at 0.05, 0.5 or 5 1/s, then liquid-nitrogen quenched

Engineering note: seed solid-material values are reference values only. Verify against the project material specification or supplier data sheet before release.